Standard Operating Procedure (SOP)
Car/Truck Battery Safety

INTRODUCTION

Lead-acid batteries contain sulfuric acid and only trained and authorized personnel should handle them. When talking about lead-acid batteries, people usually call sulfuric acid "battery acid" or the "electrolyte". An electrolyte is a general term used to describe a non-metallic substance like acids such as sulfuric acid or salts that can conduct electricity when dissolved in water.

- Use extreme care to avoid spilling or splashing the sulfuric acid solution. It can destroy clothing and burn the eyes and skin.
- Always wear splash-proof goggles and protective clothing (gloves and aprons). A face shield (with safety goggles) may also be necessary.

Batteries can weigh about 14 to 27 kg (30 to 60 lb) so practice safe lifting and carrying procedures to prevent back injuries. Use a battery carrier to lift a battery, or place hands at opposite corners.

Only work with or charge batteries if you have been trained to do so.

EMERGENCY PROCEDURES

BATTERY ACID CONTACT

Battery acid is composed of sulfuric acid. Sulfuric acid is very corrosive to human tissues. If battery acid is splashed into eyes or on skin do the following:

<u>If the eyes are splashed with acid,</u>

- Use an emergency eyewash/shower station if solution is splashed into the eyes.
- Immediately flush the contaminated eye(s) with clean, lukewarm, gently flowing water for at least 30 minutes, while holding the eyelid(s) open.
- If irritation persists, repeat flushing. Neutral saline solution may be used as soon as it is available.
- DO NOT INTERRUPT FLUSHING. If necessary, keep the emergency vehicle waiting.
- Take care not to rinse contaminated water into the unaffected eye or onto the face.
- Those assisting should avoid direct contact. Wear chemical protective gloves, if necessary.
- Call 911 for assistance.
- Quickly transport the victim to an emergency care facility.

<u>If the skin is splashed with acid,</u>

- As quickly as possible, flush the contaminated area with lukewarm, gently flowing water for at least 30 minutes.

- If irritation persists, repeat flushing. DO NOT INTERRUPT FLUSHING. If necessary, keep emergency vehicle waiting.
- Those assisting should avoid direct contact with contaminated areas. Wear chemical protective gloves, if necessary.
- Under running water, remove contaminated clothing, shoes and leather goods (e.g., watchbands, belts). Remember, acid will collect in the waistband of underwear and tops of socks. If the acid has moved to those areas or the act of washing causes the acid water to move into those areas then the undergarments should also be removed. Discard contaminated clothing, shoes and leather goods.
- Transport the victim to an emergency care facility immediately.

HANDLING BATTERIES AND BATTERY ACID

- Rinse off your gloves well before removing them. Then rinse the apron to remove any battery acid that may have contaminated it.
- Wash yourself with soap and water immediately after servicing a battery.
- Neutralize spilled or splashed sulfuric acid solution with a baking soda (sodium bicarbonate) solution, and rinse the spill area with clean water.
- Keep tools and other metallic objects (including jewellery) away from the tops of batteries.

CHARGING BATTERIES

- Charge batteries in a designated, well-ventilated area.
- Do not attempt to recharge a frozen or damaged battery.
- Follow the manufacturer's recommendations for charging rates, connections and vent plug adjustment. Properly maintained vent caps will reduce the chance of electrolyte spray.
- Unplug or turn the charger off before attaching or removing the clamp connections. Carefully attach the clamps in proper polarity to the battery.
- Rinse off batteries and clean terminals before recharging.
- Fill sulfuric acid (electrolyte) to the prescribed level before charging to reduce the possibility of the electrolyte heating up excessively. If water is added, use distilled water, not tap water.
- Turn off the charger before disconnecting the cables from the battery.

SAFETY TIPS WHEN SERVICING BATTERIES.

- Keep metal tools and other metallic objects away from batteries.
- Inspect for defective cables, loose connections, corrosion, cracked cases or covers, loose hold-downs and deformed or loose terminal posts.
- Replace worn or unserviceable parts.

- Tighten cable clamp nuts with the proper size wrench. Avoid subjecting battery terminals to excessive twisting forces.
- Use a cable puller to remove a cable clamp from the battery terminal.
- Remove corrosion on the terminal posts, hold-down tray and hold-down parts.
- Use a tapered brush to clean dirt from the battery terminals and the cable clamps.
- Use a battery carrier to lift a battery, or place hands at opposite corners.
- Do not lean over a battery.

BATTERY CHARGING/MAINTENANCE AREAS

Work areas when working with or charging batteries should:

- Have good ventilation to diffuse gases and prevent explosions.
  - Can batteries explode?
    - Yes, hydrogen gas is produced during normal battery operation. This easily ignitable gas can escape through the battery vents and may form an explosive mixture in the atmosphere around the battery if ventilation is poor.
    - Keep sparks, flames, burning cigarettes, and other ignition sources away at all times.
    - Do not break "live" circuits at the terminals of batteries.
- Be constructed with acid-resistant materials (racks, trays, floor, tools, etc.).
- Have face shields (with safety goggles), aprons and gloves of the appropriate chemical-resistant materials readily available.
- Have emergency eyewash or shower stations close by, with no obstructions along the path (stored materials, doors, etc.).
- Have equipment and supplies for flushing, neutralizing, and cleaning spilled chemicals, acid and electrolyte solutions nearby.

FILLING BATTERIES

- Keep battery deposits off your body when cleaning terminals by brushing debris away from the body.
- Do not fill battery cells above the level indicator. Use a self-levelling filler which automatically fills the battery to a predetermined level.
- Do not squeeze the syringe so hard that the water splashes acid from the cell opening.

HANDLING BATTERY SOLUTIONS

- Pour concentrated acid slowly into water: Do NOT add water into acid - the water tends to sit on top of the heavier (more dense) acid. The water can become hot enough to spatter.
- Use nonmetallic containers and funnels.

- Recap any electrolyte container and store it in a safe place at floor level.
- Do not store acid in hot locations or in direct sunlight.
- Do not store electrolyte solution on shelves or any location where the container can overturn.
- Do not squeeze or puncture a container with a screwdriver or other instrument. The acid solution may splash on face, hands, or clothing.
- Do not fill a new battery with electrolyte solution while it is in the vehicle. Fill the battery while it is on the floor, before installation.

USING BOOSTER CABLES

Sparks created from booster or jumper cables can ignite a flammable mixture of hydrogen in air causing an explosion.

Before using jumper cables:

- Wear eye protection.
- Make sure that the two vehicles are not touching each other.
- Turn off the ignition switches of both vehicles.
- Extinguish all cigarettes, cigars, and other sources of flame or ignition. Remember, explosive mixtures of hydrogen are always present in the cells of batteries.
- Remove the filler caps from both batteries to vent the dangerous hydrogen gas. This is not necessary if the vehicles are equipped with maintenance-free batteries.
- Do not charge or jump a frozen battery.
- Check vehicle/equipment service manual for specific requirements.

WARNING:

When connecting or disconnecting jumper cables, use extreme care in handling the clamps.

- Do not allow cables to touch each other, nor to touch the frame or body of either vehicle. This will prevent sparks that can cause an explosion.
- Avoid contact with the revolving cooling fans when disconnecting the cables.
- After removing the booster cables, replace the filler caps on both batteries.

BOOSTING A NEGATIVELY GROUNDED BATTERY

The vehicle is NEGATIVELY grounded when the cable attached to the NEGATIVE post of the "dead" battery is also attached to the engine block.

To connect cables:

- Clamp one end of the red cable onto the positive post of the "dead" battery.
- Clamp the other end of the red cable onto the positive post of the booster battery.

- Clamp one end of the black cable onto the negative post of the booster battery.
- Clamp the other end of the black cable onto the engine block below and away from the "dead" battery.
- Start the engine of the booster vehicle, then the engine of the "dead" vehicle.

To disconnect cables:

- Remove the black negative clamp from the engine block of the vehicle with the "dead" battery.
- Remove the black negative clamp from the booster battery.
- Remove the red positive clamp from the booster battery.
- Remove the red positive clamp from the "dead" battery.

BOOSTING A POSITIVELY GROUNDED BATTERY

The vehicle is POSITIVELY grounded when the cable attached to the POSITIVE post of the "dead" battery is also attached to the engine block.

To connect cables:

- Clamp one end of the black cable onto the negative post of the "dead" battery.
- Clamp the other end of the black cable to the negative post of the booster battery.
- Clamp one end of the red cable onto the positive post of the booster battery.
- Clamp the other end of the red cable onto the engine block below and away from the "dead" battery.
- Start the engine of the booster vehicle, then the engine of the "dead" vehicle.

To disconnect cables:

- Remove the red positive clamp from the engine block of the vehicle with the "dead" battery.
- Remove the red positive clamp from the booster battery.
- Remove the black negative clamp from the booster battery.
- Remove the black negative clamp from the "dead" battery.

FINAL NOTES

- Never store a battery on the ground. This will drain the battery.
- Never store a battery unprotected from the weather.
- Batteries can be traded in for new batteries and eliminate the core charge that venders charge for new batteries.
- Batteries to be returned to the vender or disposed must be placed in enclosed and covered storage until transferred or disposed.

- Batteries should never be discarded into the trash. Unwanted batteries or damaged batteries must be handled as universal waste. If batteries will not be returned to the vender for any reason, contact EH&S for a pickup for proper disposal. The lead and acid in the batteries would make them a dangerous waste.